Unit 3
Day 3
Dividing Complex Numbers
"Some Good Problems" Instruction

Simplify.

1) $\frac{3i}{2-6i} \cdot \frac{2+6i}{2+6i} = \frac{6i-18}{4+36} = \frac{6i-18}{40}$

$-\frac{9}{20}+\frac{3i}{20}$

$\frac{3i-9}{20}$

$\frac{3i}{20}-\frac{9}{20}$

$$\frac{3+x}{2} = \frac{2}{2} + \frac{x}{2}$$

$$\frac{6+x}{2} = \frac{6}{2} + \frac{x}{2} = 3 + \frac{x}{2}$$

Simplify.

2) $\dfrac{5-i}{3+7i} \cdot \dfrac{3-7i}{3-7i} = \dfrac{15-35i-3i-7}{9+49} = \dfrac{8-38i}{58}$

$\dfrac{4-19i}{29}$

$\dfrac{4}{29} - \dfrac{19i}{29}$

Simplify.

3) $\frac{5-3i}{1+2i} \cdot \frac{2-4i}{1+i} = \frac{10-20i-6i-12}{1+i+2i-2} = \frac{-2-26i}{-1+3i} \cdot \frac{-1-3i}{-1-3i}$

$= \frac{2+6i+26i-78}{1+9} = \frac{-76+32i}{10} = \frac{-38}{5} + \frac{16i}{5}$

$\frac{16}{5}i$

Simplify.

4)

$$\frac{2-i}{1+6i}+\frac{3+2i}{1-6i}=$$

$$\frac{(2-i)(1-6i)}{(1+6i)(1-6i)}+\frac{(3+2i)(1+6i)}{(1+6i)(1-6i)}=\frac{2-12i-i-6}{1+36}+\frac{3+18i+2i-12}{1+36}$$

$$=\frac{-4+3i}{37}+\frac{-9+20i}{37}=\frac{-13+7i}{37}=\boxed{\frac{-13}{37}+\frac{7i}{37}}$$

Simplify.

5) $\dfrac{3+i}{4+3i} - \dfrac{5-2i}{4-3i}$

7)

Find any restrictions on a and b so that $(3a+5bi)^2$ is pure imaginary? Pure real?

Simplify

$(3a+5bi)^2$

$9a^2+30abi-25b^2$

$9a^2+30abi-25b^2$

Pure Imaginary

$9a^2=25b^2$ $9a^2-25b^2=0$

$\frac{a^2}{b^2}=\frac{25}{9}$ $\frac{a}{b}=\frac{5}{3}$

$b=0$ or $a=0$

8)

Use the definition of equality for complex numbers to solve the following equations for real numbers a and b.

If $a+bi=c+di$ then $a=c$ $b=d$

$$2a-3(2+i)=-3bi+5(a+1)$$

$2a-6-3i=-3bi+5a+5$

$-3a-3i=11-3bi$

$-3a=11$ $\quad -3=-3b$

$a=-\frac{11}{3}$ $\quad b=1$

homework: Day 3 hmk + Some Good Problems (ALL)